MINISTRY OF RECONSTRUCTION.

ADVISORY COUNCIL.

REPORT

UPON THE

STANDARDIZATION OF RAILWAY EQUIPMENT.

Presented to Parliament by Command of His Majesty.

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REPORT UPON THE STANDARDIZATION OF RAILWAY EQUIPMENT.

To the Rt. Honble. Christopher Addison, M.D., M.P.,
Minister of Reconstruction.

Sir,

1. In accordance with your wishes, we have given consideration to the question whether standardization of railway equipment is desirable, and, if so, what steps should be taken to promote it, and we have now the honour to submit our report for your consideration.

We have heard evidence from the following witnesses :—

Mr. H. C. Allen, Chairman, South American Stores Committee.

Mr. C. J. Bowen Cooke, C.B.E., Chief Mechanical Engineer, London & North-Western Railway.

Mr. A. Campbell, O.B.E., Chairman, Hunslet Engine Co., Ltd. (Representing Locomotive Manufacturers' Association).

Mr. G. Churchward, Chief Mechanical Engineer, Great Western Railway.

Sir Maurice Fitzmaurice, British Engineering Standards Committee.

Mr. C. N. Goodall, Managing Director, Robert Stephenson & Co., Ltd. (Representing Locomotive Manufacturers' Association).

Mr. Albert Good, Cammell Laird & Co.

Mr. G. H. Hughes, Chief Mechanical Engineer, Lancashire & Yorkshire Railway.

Mr. R. E. L. Maunsell, C.B.E., Chief Mechanical Engineer, South-Eastern & Chatham Railway.

Mr. E. J. Moggridge, Assistant Secretary, Railway Department, Board of Trade.

Sir Ernest Moir, Director-General, Transport Department, Ministry of Munitions.

Mr. A. E. Morgan, Metropolitan Carriage, Wagon & Finance Co., Ltd.

Colonel J. W. Pringle, R.E., Chief Inspector of Railways, Board of Trade.

Sir Seymour B. Tritton, M.I.C.E., Consulting Engineer (Rendel, Palmer & Tritton).

Sir John Aspinall, M.I.C.E., M.I.S.I., Lancashire & Yorkshire Railway (Representing The Railway Companies Association).

Memoranda have been submitted for our information by The British Engineering Standards Association, The Locomotive Manufacturers' Association, Colonel J. W. Pringle, R.E., Mr. R. E. L. Maunsell, and Mr. A. E. Morgan.

It is evident that standardization of railway equipment where it is possible, by allowing of mass production on repetition work, tends to quicker delivery at a lower cost, because it enables a greater use of machine as against hand labour, and facilitates maintenance. This has been the experience in India where standardization has been adopted and we are of opinion that in countries, such as the Argentine for instance, where the conditions are well suited for it, if the Consulting Engineers would agree to design standard types of locomotives and rolling stock, the results would be equally good.

The difficulties are much greater in the case of this country. Great Britain was the pioneer of railway construction. Small independent lines have been linked up into larger systems, and consequently there are differences in structural and clearing gauges and in tunnel dimensions. In the existing state of things, any locomotive designed to run on all the various lines would have to be a compromise, and would not be the best possible for each particular railway system, and without State assistance the railway companies could not meet the capital outlay which would be involved in obtaining uniformity of conditions. But so far as the main trunk lines are concerned we were informed that a reasonably efficient engine could be designed for use generally on most of them.

The development of locomotive design has now reached a stage which allows of standard types being adopted when the conditions of the road are similar. The Railway Companies have recognised this, and have already begun to introduce standardization in so far as each company is concerned.

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The London and North-Western Railway Company, for instance, which have at present thirty-three types of locomotives, have now standardized three types for express passenger, for express passenger and goods, and for heavy goods respectively, and have also largely standardized locomotive parts such as connecting rods, coupling rods, piston rods, injectors and cylinders.

Further, the Committee on Locomotive Standardization, which was set up because the members of the Association of Railway Locomotive Engineers were of opinion that standardization was desirable, have now fixed on two standard engines with the intention to design later two engines of each type, one heavy and one light, with many of the parts common to all four. They have also instituted a Committee on Wagon and Carriage Standardization.

The Railway Companies, therefore, recognise the necessity of standardization, but, in view of the lack of material, they deprecate the immediate introduction of new types of standard locomotives for which new jigs, patterns and templates would be required which would cause delay and increase the number of parts and spaces to be kept in stock. In pre-war times the big Railway Companies built annually some four hundred and fifty locomotives out of the seven hundred required by all the railways. During this war they have been almost wholly occupied in keeping in repair their existing stock, which may therefore be estimated to have a further life of service of probably some fifteen years.

The chief mechanical experts of the main systems of British Railways, however, stated that undoubtedly economies could be effected and output increased if certain parts of engines purchased from outside firms were made standard for all Railway Companies. In this connection they referred more particularly to wheels, axles, wheel curves, tyres, &c., and also they considered that the standardization of the essential parts such as running gear, draw gear, buffing gear, bogies, brakes and under-frames was most urgent.

Competition between the big railways has tended to progress on the whole, but has resulted in a quite unnecessary multiplication of types. The evidence before us showed that on British Railways there are two hundred different types of axle boxes, that every Railway Company had adopted different types of tyres, springs, and axles—that there are over forty variations of the ordinary wagon hand-brake, that, although the Railway Companies have laid down standard dimensions governing the construction of private owners' wagon stock, as to their own wagons they claim independence of action, and do not comply with the Clearing House Regulations, and we would call attention to the fact that there are two different systems of continuous brakes involving a dual brake fitment in the case of stock that has to run over lines where the systems are different. In no other country has individuality been allowed so much free scope, with the result that British Railways are severely handicapped, and the working of them not so economical as it might be.

Other countries have not suffered as much from this riot of individuality because almost without exception locomotives and rolling stock are purchased from private firms of manufacturers. The only Railway Company outside Great Britain that manufactures most of its own stock, we were informed, is the Pennsylvania Company, in the United States, and this is done in order to keep check on the private manufacturers.

The Locomotive Manufacturers' Association pointed out that the British Railway Companies, who at first bought all their locomotives from private firms, first found it necessary to set up their own repair shops, then started building their own locomotives, and from this gradually extended their operations over the whole field of railway machinery. The Railway Companies state that they can themselves build more cheaply, that they save the manufacturers' profit, cost of advertising, &c., and have not got to build up a reserve of capital, but they allow that in their costs they do not provide for rates and taxes, ground rent and depreciation.

We were impressed with the necessity from a business point of view of having the costs of construction in the railway workshops thoroughly investigated by competent and independent audit. This the Locomotive Engineers of the Railways said they should welcome.

We would call attention to the amount of dead weight carried on British Railways. The tare of an eight ton wagon built to the Clearing House Regulations is seventy per cent. of the load, as against the forty to forty-five per cent. of the wagons of other countries.

CONCLUSIONS.

We think it desirable in the national interest to carry out standardization of railway plant as far as it is practicable to do so, and as immediate steps towards this end we recommend :—

1. That the standardization of wheels, axles, wheel-centres, tyres, running gear, draw gear, buffing gear, bogies, brakes and under-frames be dealt with immediately by the Engineering Standards Committee on which all interested, including private builders and makers of materials, should be represented, and that when such essential parts have been standardized, the adoption of the standards should be gradually enforced.

In view of the difficulties of standardizing complete locomotives and other rolling stock under existing circumstances and of the excessive amount of dead weight now carried on British Railways, we recommend :—

2. That a Committee be formed to investigate the existing conditions of structural ganges and clearances of the British Railways and the loading and unloading arrangements at works and ports in order to ascertain how far uniformity could be introduced and tares reduced, and at what cost.

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3. That the costs of construction of locomotives and rolling stock by the railway workshops and by private firms respectively be investigated and ascertained by competent independent accountants appointed by the Government.

In view of the great demand for rolling stock that there will be at the close of the war in this country and elsewhere, we feel that, in order to expedite delivery and to secure production at the lowest possible cost, standardization is very necessary for the export trade. We recommend, therefore :—

4. That the Consulting Engineers and Representatives of railways financed by British capital in foreign parts and in the Dominions be brought together to confer with the locomotive and wagon manufacturers in this country to determine what standardization can be effected, and that, with a view to the possibility of effecting partial international standardization, the separate Committees should take cognisance of each other's investigations.

We have the honour to be,

SIR,

Your obedient Servants,

CHARLES METCALFE (*Acting Chairman*).
CLARENDON HYDE (*Vice-Chairman*).
ALFRED BOOTH.
E. TOOTAL BROADHURST.
VERNON HARTSHORN.
W. L. HICHENS.
H. J. MACKINDER.
ADAM NIMMO.
ALEX. ROGER.
J. H. THOMAS.
W. ROWAN THOMPSON.

H. EUSTACE DAVIES,
Secretary to the Council.

T. R. GARDINER,
Secretary to the Section.

4*th July*, 1918.

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